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away beyond our ken in the structure of matter, say of copper, will confess that the chemist can point to a certain set of properties which are necessary and sufficient to delimit copper from every other known substance. The question here raised is similar, namely, Can forces be grouped into a class by themselves? And, if so, what are the marks, or the one mark, by which this class is set off from the other physical quantities? Dr. Dadourian, in his "Analytical Mechanics," p. 15, has perhaps given an answer to this question: but if so, only by introducing a term—*action*—which the intelligent reader will consider an undefined synonym of *force*, equally complex and equally indefinite.² Every one agrees that a force is represented, in a general way, by a *push* or *pull*; but the question here raised is this: How is a *push* to be defined in a quantitative and consistent manner?

Returning now from this digression suggested by Professor Guthe's treatment of mechanics, the definitions in *Sound* and *Heat* are brief and excellent. Those in Magnetism and Electricity are introduced with the interesting remark that "the existence of ether in space is accepted as a means of interpreting phenomena that can not be explained by the properties of ordinary matter." The definitions which follow are especially fine and are certain to furnish new and helpful viewpoints to any serious student; the same is true of the section devoted to optics. Where differences of opinion might arise—and they are numerous—one feels always that the text, as it stands, clearly sets forth the essential facts of the case.

HENRY CREW

Introduction to the Study of Igneous Rocks.

By GEORGE I. FINLAY, Ph.D. New York and London. McGraw-Hill Book Company, Inc. 1913. Pp. vii + 228. Price \$2.00 net.

This little book is said by its author to be intended as an introduction to the exhaustive treatises on the subject of igneous rocks, and consists of a brief statement of the qualitative classification of igneous rocks; a description

of the method of determining such rocks in hand specimens, and a short chapter on the optical properties of minerals and the methods by which they are determined. This is followed by chapters on identification of the essential and accessory minerals of igneous rocks; and by chapters on the "igneous type rocks" and of varietal rocks related to the type rocks; a brief synopsis of a method of describing rocks; and an outline of the quantitative classification of igneous rocks, with numerous examples of the method of calculation of the norm, with numerical tables to facilitate the calculation. There are also tabulated statements of the physical characteristics of the chief rock minerals.

The book is well gotten up and is to be commended for its author's appreciation of the value of quantitative methods of determination and description, and for his simple and direct manner of describing the ordinary method of procedure in the customary identification of rocks in hand specimens, and of minerals under the microscope.

It is a mistake, however, to call the book an introduction to the more serious study of igneous rocks as set forth in larger treatises on the subject. It would seem to have been prepared for a class of students who did not intend to study the subject thoroughly, a very large and legitimate class who desire only a slight knowledge of the subject. For the work labors under the disadvantage of an attempt to simplify a highly complex subject, and to express in a few words ideas and definitions which require fuller statements and amplification in order to be correct. The attempt has led the author into some errors that he might have avoided. It has emphasized the idea of rock types, which will lead students to expect what they will not find in nature, and it has given false ideas as to the composition of rocks having the commonest names. The author himself remarks that the concise statement made in the table of igneous rocks on page 98 may readily be misinterpreted by the beginner. Why then make it? It certainly conveys the impression that andesites are characterized by mica and amphibole, and that

² See Rettger, SCIENCE, January 23, 1914, p. 140.

pyroxene is subordinate. One who is not a beginner knows that most andesites contain more pyroxene than mica or amphibole; and in many instances pyroxene without either mica or amphibole. The impression is also given that granite does not contain lime-soda-feldspar. There are numerous inaccuracies of statement and definition that might be pointed out, which may be charged to the attempt at simplification. It does not seem desirable that students who intend studying petrology thoroughly should begin by studying it in an inadequate manner, and experience the necessity of remodeling some of their fundamental concepts.

JOSEPH P. IDDINGS

An Introduction to the History of Medicine, with Medical Chronology, Bibliographic Data and Test Questions. By FIELDING H. GARRISON, A.B., M.D. Philadelphia, W. B. Saunders Co. 1913.

The reproach that has been brought against modern science to the effect that it looks only to the present and future and gives little consideration to the past, probably finds the least amount of justification in the case of the medical sciences, if one may judge from the rapid increase within recent years in the amount of literature, both periodical and monographic, that deals with the history of these sciences. But it has been to France, and more especially to Germany, that we have been principally indebted for compendious treatises on the history of medicine, the only works of that nature written within recent years by English-speaking authors being the brief "Epitome" of Dr. Roswell Park and the delightful "History of Physiology" by Sir Michael Foster. The publication of the work before us is, therefore, an event of no little interest, since it places in the hands of English readers a reliable, comprehensive and interesting account of the development of medical theory and practise, from the earliest times down even to the present day. It is noteworthy also in that its production has been made possible by the unequalled collection of works dealing with the history of medicine that has been brought to-

gether in the library of the surgeon-general at Washington. Dr. Garrison is to be heartily congratulated upon the excellent use he has made of it.

The book opens with an introductory chapter on the identity of all forms of ancient and primitive medicine, and then follow chapters on Egyptian, Sumerian and Oriental, Greek (under which are included the Alexandrian and Roman schools), Byzantine, Mohammedan and Jewish, and medieval medicine, all these being treated in the brief space of one hundred and thirty pages. Then follows a well-balanced chapter on the period of the Renaissance, but the greater part of the book, nearly five hundred pages out of six hundred and sixty odd, is devoted to the history of the sixteenth to the twentieth centuries, the chapter on the twentieth century giving a welcome review of the development of our knowledge of such subjects as the internal secretions, the synthesis of proteins, parasitology, chemo- and sero-therapy.

Each chapter consists of a biographic and a general portion, the former setting forth the main features of the lives, endeavors and accomplishments of those who have contributed in any degree to the advancement of medicine, while the latter sums up succinctly and clearly the conditions under which they lived and worked. As appendices there are added a useful medical chronology, a bibliography and a number of test questions, many of which suggest interesting topics for further study and investigation. Finally, mention should be made of the excellent indexes, one of persons and another of subjects, both of which appear to be entirely satisfactory.

Dr. Garrison's book forms a trustworthy reference for those who are interested in any phase of the development of medicine. No name worthy of mention, unless it be that of Dodoens, seems to have been omitted, and although the treatment is fundamentally biographic, the subject index makes it easy to ascertain the essential events in the development of special departments of medicine. And yet with all this thoroughness in so small